chalk, gave no indications of sugar. Sugar, however, together with a good deal of mucilage and resinous matter, with some larixinic acid, is contained in the crude decoction of larch-bark.

Bark of the common black Mangrove (Rhizophora Mangle *of botanists*).—This species of mangrove-bark is used in tanning, and is occasionally imported into Great Britain for this purpose. It has a brownish-red colour: the colour of its decoction is the same. The tannin it contains is precipitated from its solution both by acetate of lead and concentrated sulphuric acid. When boiled with dilute sulphuric acid no sugar is produced, and the brownish-red precipitate which falls cannot be made to crystallize.

In conclusion, I would observe that it is somewhat remarkable that so many of the tannins which give bluish-black precipitates with persalts of iron are glucosides; whereas of those which give olive-green precipitates with persalts of iron, so far as I know, only one —to wit, the tannin of the willow—is a glucoside.

II. "On Larixinic Acid, a crystallizable volatile principle found in the Bark of the Larch Tree (*Pinus Larix*, Linn.)." By JOHN STENHOUSE, LL.D., F.R.S., F.C.S. Received July 10, 1861.

(Abstract.)

This acid is prepared by digesting larch-bark in water at 80° C., evaporating the infusion at the same temperature to the consistence of syrup, and distilling it in vessels of glass, porcelain, or silver; *i. e.* of a material not liable to be attacked by the acetic acid present in the infusion. The larixinic acid distils over, and partly crystallizes on the inner surface of the receiver, but chiefly remains dissolved in the distilled liquid, which, after being concentrated by cautious evaporation, deposits the impure acid in form of crystals. These are of a brownish-yellow colour; they are to be dissolved and recrystallized, and may be obtained quite pure by sublimation, which takes place at the low temperature of 93° C.

This acid exists as a proximate principle in the larch-bark; most abundantly in that from trees of not more than 20 or 30 years' growth, or from the smaller branches of older trees. When pure, it forms beautifully white crystals, often more than an inch long, of a

silvery lustre, and much resembling benzoic acid in aspect. They sublime at 93° C. and melt at 153° C.; but in aqueous solution the acid volatilizes at ordinary temperatures. The crystals belong to the oblique system, and usually occur in twin form. The measurement of the angles, as determined at the author's request by Professor W. H. Miller, is given in the Paper.

Larixinic acid, like naphthalin and camphor, emits a sensible smell at ordinary temperatures; its taste is slightly bitter and astringent. It very feebly reddens litmus, and a single drop of potash or ammonia suffices to render a large quantity of it alkaline. It is very soluble in boiling water, but takes 87 or 88 times its weight of water at 60° to dissolve it; it dissolves also in cold alcohol, but much more largely in hot alcohol, and sparingly in ether. The crystals are inflammable, and burn with a bright flame, leaving no residue.

Three analyses of the crystals gave the following results:—

	Calculated numbers.		Found.		
C_{20}	= 57·14		57·13	57·06	57·09
H_{10}	= 4·77		5·04	5·09	5·04
O_{10}	= 38·09		37·83	37·85	37·87

The carbon, hydrogen, and oxygen are therefore in the proportions C_2, H_1, O_1, and the author adopts C_{20}, H_{10}, O_{10} as the most probable actual multiples of these numbers.

With ammonia, larixinic acid forms a combination so feeble as to be severed by the mere volatility of the ammonia; in this respect, as well as in forming no hydrate, resembling pyrogallic and oxyphenic acids. With potash it forms long flattish crystals of a reddish-brown colour, which deepens on recrystallization. This combination is decomposed by carbonic acid; it was not obtained of constant composition. Larixinic acid gives no precipitate with lime-water or saccharate of lime; with baryta it forms a bulky, gelatinous precipitate, like hydrated alumina, easily decomposed by carbonic acid, and found from two experiments to contain 34·92 per cent. of baryta.

Solution of larixinic acid gives no precipitate with basic or neutral acetate of lead, perchloride of platinum (even with heat), nor with nitrate or ammonio-nitrate of silver, although, when boiled with the latter salt, it reduces the silver.

This acid contains no nitrogen; it does not reduce oxide of copper in Trommer's test; it dissolves in concentrated sulphuric acid without forming any conjugate combination. When boiled with a mixture of hydrochloric acid and chlorate of potash it is decomposed, but without giving rise to chloranile; it gives no coloration when boiled with solution of hypochlorite of lime. Nitric acid, especially when aided by heat, attacks larixinic acid, leaving oxalic acid as the only fixed product. When heated with bromine it is destroyed, hydrobromic acid vapours are given off, and an uncrystallizable resin remains. Salts of copper give to solutions of larixinic acid an emerald-green colour, but cause no precipitate; chloride of manganese produces neither coloration nor precipitation. Characteristic effects are produced by salts of iron: perchloride and persulphate give a beautiful purple colour which stands dilution well; and larixinic acid becomes in this way an excellent reagent for detecting the presence of iron, even in minute quantity. It does not affect neutral proto-nitrate of mercury in the cold, and on the application of heat no mercury is reduced.

This acid appears to be peculiar to the larch tree; at least the author has not been able to find any trace of it in the spruce fir (*Abies excelsa*), or in the Scotch fir (*Pinus sylvestris*). It evidently belongs to that small group of substances, of which pyrogallic acid and pyrochatechin, the oxyphenic acid of Gerhardt, are the only other members yet known. It is much less easily oxidizable than oxyphenic acid, which again is less easily oxidated than pyrogallic acid. Larixinic acid volatilizes at a much lower temperature than either of these two substances, from which it also differs in being a ready-formed proximate principle, and not an educt.

III. "On the Great Magnetic Disturbance of August 28 to September 7, 1859, as recorded by Photography at the Kew Observatory." By Balfour Stewart, Esq., A.M. Communicated by General Sabine, R.A., Treas., V.P.R.S. Received June 28, 1861.

(Abstract.)

During the latter part of August, and the beginning of September, 1859, auroral displays of almost unprecedented magnificence were